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Enhancing Battlespace Awareness By Centralizing National Imagery and Mapping Databases: A Force Multiplier

by

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A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

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ABSTRACT

One band of the battlespace information spectrum particularly relevant to operational activities and the operational commander is *geospatial information* (i.e. mapping, charting, geodesy, imagery, and imagery intelligence). The National Imagery and Mapping Agency (NIMA) was established on 1 October 1996 by Congress to provide improved geospatial information management for the Department of Defense (DoD). Seven organizations were consolidated to make NIMA, with the goal of centralizing mapping and imagery databases. The effectiveness of centralizing the geospatial databases is measured in this paper by evaluating its impact on products, using the attributes of intelligence quality as a guide. The impact to the operational commander is that commanders at all levels in each service will have the same references and the same information. In addition, with all data sources placed in a common geospatial framework, the commander will be able to fuse all data sources, and thereby have the opportunity to develop a dominant awareness of the battlespace. The commander's route to the geospatial databases is being broadened during the next several years. To effectively use all aspects of the new geospatial information infrastructure, the commander will need to understand the changes that are being implemented. Towards that end, a review of the infrastructure is given here. The changes in all facets of the geospatial information domain are profound in that they have the effect of a force multiplier for the operational commander.

Enhancing Battlespace Awareness By Centralizing National Imagery and Mapping Databases: A Force Multiplier

"If there was one lesson learned from the Persian Gulf that still rings clear, it was that today's modern battlefield has moved into the information age, where good intelligence and battlefield awareness are often more critical than the quantity and quality of tank or technical aircraft." U.S. Representative Floyd Spence, 1996.[1]
Chairman, House National Security Committee

I. Introduction

One band of the battlespace information spectrum particularly relevant to operational activities and the operational commander is *geospatial information* (i.e. mapping, charting, geodesy, imagery, and imagery intelligence).[2] It gives the commander a framework to place additional battlespace data based on time and geographic location. Fusing all data sources placed in the geospatial framework gives the commander the opportunity to develop an awareness of the battlespace, and thereby make decisions faster than the enemy, the core concept of knowledge-based warfare.[3] Accordingly, geospatial information is the foundation for achieving dominant battlespace awareness.

The National Imagery and Mapping Agency (NIMA) was established on 1 October 1996 by Congress to provide improved geospatial information management for the Department of Defense (DoD).[4,5] It is a consolidation of separate intelligence and defense organizations that dealt with imagery and mapping. The goal is to have one organization for all geospatial information: a centralization of mapping and imagery databases, so that commanders at all levels, in each service, have the same references and the same information. The Director of Central Intelligence (DCI) claimed that NIMA "will improve efficiency, save money, and put us in a better position to take advantage of technological breakthroughs."[6] The challenge for NIMA is to build

global geospatial databases, thereby providing the operational commander the framework on which to build a common view of the battlespace. Working in the information domain, NIMA is one step towards achieving the information superiority envisioned in Joint Vision 2010.[7]

This paper focuses on the impact to the operational commander from the formation of NIMA. It emphasizes the potential from centralizing the imagery and mapping databases: increased access to information, in greater amounts, in less time. Operational commanders must understand the new Geospatial Information Infrastructure to use it effectively to achieve dominant battlespace awareness. It plays a part in all the emerging operational concepts: dominant maneuver, precision engagement, focused logistics, and full-dimensional protection.[8]

II. Evolution of Geospatial Information: From the Cold War into the post-Cold War Era

Today, as much as during the Cold War, image intelligence is vital to the mission of the intelligence and defense communities. For example, in the Gulf War, the armed forces used input from image intelligence to make accurate delivery of precision munitions.[9] The intelligence and defense communities, along with policymakers, need it to understand an increasing range of activities.[10] In addition, satellite imagery remains the primary source for most NIMA-produced mapping products.[11] In this capacity, satellite imagery is essential to the mapping community.

The environment of the Cold War set the terms for image intelligence development.[12] The focus was on the means to collect information, with relatively less on exploitation and dissemination. Cost was a secondary consideration because intelligence products were so unique in providing critical information for military and national users. Technology available at the time was capable of supporting largely separate system solutions. Separate non-integrated programs

also existed because of the procurement process, where acquisition oversight was not prescribed. However, security constraints also prevented all users from being brought into the decision process to balance needs, technological opportunities, and cost.

The world political environment and the pace of technological change have determined the conditions for image intelligence development in the post-Cold War era.[13] First, information demand pull replaces collection technology push: the user now selects the information required, instead of the producer making products regardless whether the user needs it or not. Technology has evolved to the level where image collection is no longer constraining. Multiple platforms, including commercial imaging systems, now allow users to determine what collection is needed. Second, the information revolution has led to a shift in emphasis from satellite collection to information distribution. The technical capability now exists to configure an information system (C4I) for collection, processing, transmission and dissemination of information.[14] In addition, the difference in technical capabilities between image collection and image exploitation has leveled off so that comparable attention is now given to both. Third, whereas cost was a secondary consideration, it is now a primary one as fiscal resources tighten with the end of the Cold War. Technology advances allow commercial suppliers to provide a greater share of image intelligence assets, both hardware and software. The challenge will be in deciding which systems to pursue.

The President and Congress appointed a bipartisan panel of 17 members to review the efficacy and appropriateness of U.S. intelligence activities in the post-Cold War global environment. The panel was created in the Intelligence Authorization Act for FY 1995: "the Commission on the Roles and Capabilities of the U.S. Intelligence Community."[15] In its report,[16] the group concurred with the prevailing notion that geospatial information within the defense and intelligence communities needed central management and organization. Congressional testimony

by the DCI John Deutch, also emphasized the need for reorganization of the imagery and mapping communities because of technological change and the rise of regional conflicts in the post-Cold War era.[17]

Within such an environment, NIMA was established. Its mission is to provide timely, relevant, and accurate geospatial information in support of national security objectives.[18] NIMA completely incorporated the Defense Mapping Agency (DMA), Central Imagery Office (CIO), and the Defense Dissemination Program Office. Also included were the mission and functions of Central Intelligence Agency's (CIA) National Photographic Interpretation Center (NPIC). The imagery exploitation, dissemination, and processing elements of the Defense Intelligence Agency (DIA), National Reconnaissance Office (NRO), and the Defense Airborne Reconnaissance Office (DARO) were absorbed as well. NIMA is a Combat Support Agency, but because of its unique responsibilities and global mission, it is also part of the U.S. Intelligence community. Expectations are high as reflected in remarks by Deputy Secretary of Defense White: "This streamlined agency is part of the revolution in military affairs that will fundamentally change what we do."[19]

III. Centralized Information Databases: Advantages for the Operational Commander

One measure of the effectiveness of centralizing geospatial information is to evaluate its impact on products, using the attributes of intelligence quality as a guide. Joint Pub 2-0, Joint Doctrine for Intelligence Support to Operations,[20] describes the attributes of intelligence. They form objectives and standards for assessing activities and products. Operations may potentially fail for shortcomings in any one of the attributes. Following is a product evaluation against them.

A. Timeliness: Intelligence must be available in time to be effective.

The operational commander will benefit through improved response to information requests. The response improvement will come from converting vertically-integrated imagery and mapping production systems to a "client-server" system. In this new architecture, imagery and spatial data will move from collection through exploitation and distribution (e.g. magnetic media) in a totally softcopy, digital format. This architecture accommodates interoperability with the Defense Information Systems Network (DISN) so that geospatial information will eventually be disseminated electronically.

Efficiency improvements in the processes of imagery collection, data extraction, and information dissemination, will also give a more timely response to the commander. Congress gave NIMA the responsibility for imagery requirements management, for tasking of imagery collection, for coordinating image processing and exploitation, and for ensuring image dissemination and archiving.[21,22] To enable the image flow, NIMA was also empowered to prescribe the technical architecture and standards for imagery processing and dissemination and to ensure compliance with such a framework.[23]

NIMA is not responsible for developing, procuring, or operating imagery collection systems.[24] They are responsibilities of NRO, DARO, and intelligence elements of the military services. NIMA is not replacing current organizations for tactical military exploitation and use of imagery products, but will be an intermediary between them and the high end of the imagery spectrum.[25]

A major task described by NIMA Director, Rear Adm. Dantone, is to determine which imagery systems can be retained or reformatted, and to get rid of the others. The objective is to go from a series of imagery systems and programs to a single integrated base.[26] From the

unification of imagery management and processes, and with the move to a prescribed technical architecture and standards for image processing and dissemination, Rear Adm. Dantone anticipates that within a few years, users will have access to images and maps that are 30 days old or newer, as opposed to a year or more.[27]

An improved response in imagery requests will come from expanded use of commercially-generated imagery. Prior to NIMA startup, DMA had already bought more than one million square miles of commercial SPOT imagery since the 1991 Gulf War. One NIMA goal is to build a database of 100% coverage of the world in 10 meter resolution imagery,[28] and commercial imagery will be used to accomplish it. A savings may also result as users in other DoD organizations recognize that commercial multi-spectral imagery (MSI) is acquired through NIMA. (MSI is made of images collected in different wavelength bands that give false-color scenes when combined together, an example being LANDSAT.) The acquisition and archiving of MSI data will eliminate redundant purchases of imagery, and uncoordinated purchases at higher cost.[29]

While intelligence and defense funding continues to tighten, the motivation to establish NIMA is an issue of effectiveness of the capabilities that can be provided to the operational commander, not as an issue of cost savings. Ample Congressional testimony from representatives of each Service and the Deputy Secretary of Defense, demonstrates the intent of forming the agency: increase the effectiveness of the commander, in terms of timeliness and in terms of completeness of information.[30] Cost savings may be realized in time, but it is not the central motivating factor.

B. Objectivity: Intelligence should be unbiased and undistorted to be objective.

The new agency eliminates the organizational barriers among members of the imagery community. It centralizes imagery tasking, imagery interpretation, mapping, charting and geodesy, and dissemination functions of seven organizations. Consolidating these organizations should foster the eventual removal of any biases between them. The synergy of resources and experience has the potential to develop creative solutions to demands for imagery and imagery-derived information.

C. Accuracy: Intelligence must be factually correct and convey the situation as it exists.

An improved response to information requests will manifest itself in increased accuracy of geospatial information. The earliest production of vector-formatted products has been from existing cartographic sources. (Vector products use points, lines and areas to portray features; raster products use arrays of image pixels to portray maps.) To ensure that vector position accuracy is highest, production is shifting from cartographic to photogrammetric sources, so that positions are derived from triangulation rather than cartographically-displaced symbols. This accuracy will provide the precision required for the future battlespace where precision-guided munitions and Global Position System-aided (GPS) troops will be the norm.

The operational commander needs to know the quality of the geospatial information. To this end, most data sets carry auxiliary information on relative and absolute accuracies. But many digital data sets were intended for specific systems and are now being extended to new uses that require their own "measures of trust" (i.e. metadata). To address this requirement, the data sets will be produced with spatial metadata standards, in essence giving data on the data (e.g. source, currency, lineage, etc.).

To ensure that imagery and geospatial data will fuse, all the data must also be referenced to a common datum. Most products are now referenced to World Geodetic System (WGS) 84, but having all on a common standard across all products in the imagery and mapping community will ensure co-referenced data sets. Geocoded raster and vector data will align for visualization and support evaluation, particularly if the metadata of the data sets is comprehensive.[31] The requirement for data referenced to WGS 84 is critical to operational and tactical maneuver, since the Global Positioning System (GPS) is referenced to the same datum.[32]

D. Completeness: Commanders must receive all the intelligence available to accomplish their mission.

The operational commander, with one focal point for geospatial information, will have the benefit of full customer support, most visible through Customer Support Teams (CSTs) placed at customer sites. CSTs work first with customers to understand what they need, and then within the agency to determine how best to satisfy those needs. They can also give indication of emerging requirements, and help in cultivating a "smarter consumer/smarter provider" environment. The Customer Support Office provides guidance in prioritizing customer requirements, as well as serving as a link into the production offices to satisfy customer demands in a timely and efficient manner. NIMA has flattened its organization so customers are now close to the cartographers and image analysts, ensuring that only needed information is extracted and produced.

The intelligence and defense communities, and civilian agencies, are represented on customer impacts from proposed NIMA actions through the NIMA Customer Advisory Board. The board is co-chaired by the Vice Chairman of the National Intelligence Council, and the Deputy Director for Operations of the Joint Staff (J-38). NIMA's support strategy is also

periodically reviewed by the Senior Steering Group, under co-chairmanship of the Under Secretary of Defense (Acquisition and Technology), the Vice Chairman of the Joint Chiefs of Staff, and the Deputy DCI.[33]

The operational commander will benefit in completeness of information by having a single source for geospatial information. Congress gave NIMA the responsibility to be the focal point.[34] Having one agency be the focus for geospatial information prioritizes requirements uniformly across the community, eliminates duplication, and uses resources efficiently. In addition, Congress assigned NIMA the responsibility to identify and advocate customer needs for a growing and diverse customer pool.[35] The needs of the operational commander include, for example: training in using the image and geospatial databases; identifying the type, quantity, scale of information needed; accuracy requirements; metadata requirements; and program management.

A response improvement will also be enabled by the emphasis on providing the needed information, not products. Mr. W. Douglas Smith, NIMA Deputy Director for Corporate Affairs, said that with the effort going to providing information, the data would be available as rapidly as possible.[36] This strategy has been adopted in NIMA's core mission.[37] It is feasible in a "data warehousing" or federated databasing architecture, where user access data is stored in thematic layers. Such a client-server architecture is being adopted.[38]

E. Relevancy: Intelligence should be relevant to determining, planning, conducting, and evaluating operations.

The operational commander will benefit from geospatial information resources that are relevant, current and properly prioritized for production to meet current and foreseeable demand. Congress required prioritization to achieve the proper relevancy.[39] The legislative charter for NIMA makes it a Combat Support Agency so that it is under control of the Secretary of Defense.

But it also provides for DCI to have a clear and prominent role in tasking imagery systems and exploiting imagery products.[40] In particular, DCI resolves conflicts in priorities placed on national imagery collection systems.[41] Such an arrangement gives improved support to defense operations and planning, as well as national users, a conclusion reached by Congress and by the Commission on the Roles and Capabilities of the U.S. Intelligence Community.[42,43] The President called for closer coordination of defense and intelligence space work for national security, and this moves in that direction.[44,45] To assure that relevant geospatial information is produced and maintained, the CST is in place with the users to make sure that the right products are produced.

F. Usability: Intelligence must be in a form suitable for application when it is received.

The operational commander will benefit in the wide adoption of data specifications throughout the imagery and mapping production community. Data standards and conventions facilitate information exchange: the ability to electronically exchange mapping and imagery information with anyone, regardless of system being used. The advantages to this approach are: (1) support of world-wide military operations, (2) interoperability among DoD systems and (3) integrated information exchange developments.

All secondary image dissemination throughout DoD must comply with the National Imagery Transmission Format Standard (NITFS). For mapping information, NIMA has established a standardization program, the goal being a suite of standards for the exchange, manipulation, and display of digital mapping, charting and geodetic data (MC&G). The standards will assist in compatibility and interoperability of MC&G databases supporting simulators, command and control, and weapon systems. NIMA is a member of the Defense Standardization Council, and has been designated to manage the MC&G technology program.[46]

NIMA continues the role already played by DMA in the international community, where co-production agreements with other countries have been written and standard product specifications are already established or in development (e.g. the Digital Geographic Information Working Group, which is publishing the Digital Geographic Exchange Standard). In the national domain, NIMA leads in standardization efforts, while cooperating with the development of a national spatial data infrastructure (e.g. the Federal Geographic Data Committee).

Standards are found in a hierarchy: (1) the environment level (NIMA will comply with standards in hardware, operating systems, query languages, graphic interfaces), (2) the exploitation level (NIMA will test and certify user-nominated modules for projection, grid and datum transformations, etc.), (3) the data directory level (NIMA will co-develop indexing and cataloging schemes, legend and marginalia, etc.), (4) the product level (design, accuracy, symbolization, etc.) are defined by Military Specification and Military Standards, (5) the Data Dictionary level (NIMA will co-develop the spatial data structure, raster and vector, and feature coding scheme), (6) the format level standards (the exchange format and export mechanism, ISO 8211), and (7) Media level (e.g. 9-track tape; NIMA will comply with industry standards). Various standards will emerge as the technology develops and information continues to evolve. In this perspective, standards work is not a one-time effort, and NIMA needs to continue its role in this area.

G. Readiness: Intelligence assets and resources ...must be maintained in a high state of readiness,...and be capable of producing and disseminating intelligence.

The operational commander will benefit in the quality of geospatial information with one agency managing and maintaining the production process and inserting technological developments to sustain its modernization. With representation from a single agency, the U.S.

government will be enabled to team with industry in developing technologies that match common internal NIMA production requirements, thereby sharing the risks and rewards at minimal impact to all involved. It will put NIMA in a position to influence industry leaders to develop products and services to better match needs. Information will be exchanged with industry by visits, demonstrations, and conferences. Breakthroughs in technology will be more quickly acquired through out the whole imagery and mapping community, through one procurement office. This is in keeping with the intentions of Congress in establishing NIMA: "...would..harness, leverage, and focus rapid technological developments to serve imagery, imagery intelligence, and geospatial information customers."[47] NIMA has established a Commercial Advocate Office to focus its industry coordination.[48]

IV. Commander's Access to Information: the Global Geospatial Information Infrastructure

A. Current Access to Geospatial Information

Currently, requests for geospatial information are sent through the NIMA Liaison at the Unified Command level, or directly to NIMA headquarters. Liaisons at the Commands are on-site to answer immediate needs, and to keep aware of plans and foreseeable requirements. In addition, the Joint Staff, Unified Commands, Services, and Defense Agencies, annually submit to NIMA their prioritized geospatial requirements for the coming year, as well as new product requirements.[49] Special products and requests are submitted through NIMA headquarters.

NIMA product metadata is available in the Standard NIMA Catalog (hardcopy), the NIMA Softcopy Catalog (on CD-ROM), and also in limited amounts by Internet (unclassified),

and DISN (classified). The NIMA Webpage[50] shows the product line, and summary product specifications(unclassified versions).[51] The NIMA Softcopy Catalog of Topographic, Aeronautical, Hydrographic, Digital and Other Products,[52] gives the capability to use a personal computer to browse, select products, develop orders and access on-line servers to update catalog data.

In the current environment, maps are still available on paper, while imagery is produced on film and hardcopy prints. The products are bulky, but are a highly demanded media. In the Gulf War for instance, 90 million paper maps were printed and transported to the theater.[53] Increasingly over the last several decades, geospatial data is being produced in digital form, in raster (pixels) or vector (point, line, area) format. The digital data are distributed on transportable media (e.g. CD-ROM, 8 mm magnetic tape).

B. Planned Paths to Geospatial Information

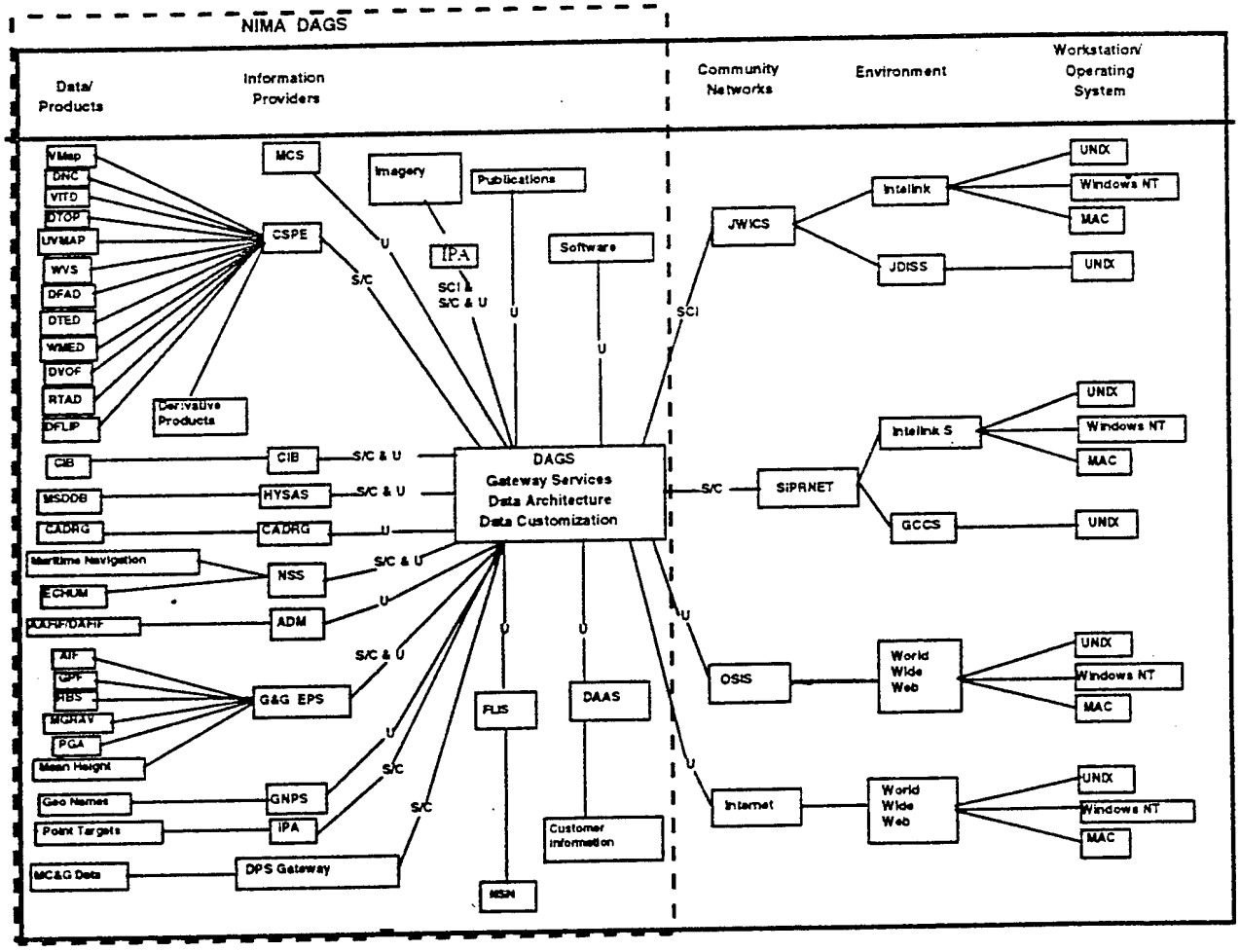
Hardcopy geospatial products will be available for many years. Printing and hardcopy product distribution are being consolidated in a new facility.[54] The facility, scheduled to be operational in March 1998, will include new printing systems and technologies. Customer responsiveness is expected to improve, as is efficiency in operation. The Remote Replication System, a system already acquired and operational, has already proven its value on-site in the Bosnia conflict. The system is capable of manipulating existing mapping products by overlaying new information, such as land mines on different roads, and then printing full-size maps on-site.[55] In late 1996, NIMA announced that it is transferring responsibility for hard-copy product distribution to the Defense Logistics Agency by March 1998. The move will improve customer support, as determined in a cost-benefit analysis for the Joint Chiefs of Staff.[56]

In the near future, in addition to hardcopy products, the operational commander will have access to geospatial information by electronic means from 'data warehouses.'[57,58] Maps, charts and imagery files will be downloaded at the user's site, displayed on monitors, and played out on paper if hardcopy is required. The global geospatial information framework and infrastructure that will give the operational commander access to geospatial information through the defense information infrastructure is the "U.S. Imagery and Geospatial Information System (USIGS)." Contract to build the system was awarded in January 1997.

The USIGS will implement an open-system processing environment that uses distributed architecture, based on government-owned and commercially available hardware and software.[59,60] The environment will be a Gateway Service for national and military customers. It will be the single electronic interface between NIMA libraries and customers. The services will provide perusal of NIMA holdings, on-line ordering for authorized customers, and on-line transmission of digital data. The NIMA libraries will have a logical design that supports imagery, imagery products, imagery intelligence and geospatial information. Customers will have the capability to tailor data to meet their needs.

In the USIGS, NIMA holdings are partitioned into a number of databases. They include: Aeronautical Data (ADM), the Controlled Image Base (CIB), Geodesy and Geophysical Data (G&G EPS), Geodetic Information (G&G EPS), Geographic Names (GNPS), Hydrographic Data (HYSAS), the Modernized Catalog (MCS), Navigation Safety (NSS), Digital Production (DPS Gateway), the Imagery Product Archive (IPA), Compressed Arc Digitized Raster Graphics (CADRG), and Digital Product data (CSPE). Access to NIMA holdings will be through the DISN. The Joint Worldwide Intelligence Communications System (JWICS) will be used for SCI data, and the Joint Deployable Intelligence Support System (JDISS) and Intelink environment will

provide the conduit. The Secret Internet Protocol Router Network (SIPRNet) will be used for Secret/Collateral products, and the Intelink-S and Global Command and Control System (GCCS) environment will provide the conduit. OSIS (Sensitive but Unclassified) and the Internet will be used for unclassified data. The databases and the access to them is illustrated in the following figure.[61]



U.S. Imagery and Geospatial Information System(USIGS)
Data Architecture and Gateway Services: Conceptual Data Flow

V. Conclusion and Recommendations

The expression 'force multiplier' describes a process that improves effectiveness or productivity at a reasonable cost. Examples include improving the accuracy of munitions, and developing new doctrines for using forces. The effect of a multiplier is to give the operational commander the ability to do more without increasing force size or cost.

By this definition, the centralization of geospatial databases is a force multiplier. It gives the operational commander increased access to information, to the specific information needed, at increased accuracy, in substantially less time. In addition, it provides the commanders at all levels in each service, the same geospatial information on a common framework. These improvements come to bear for the operational commander in the new operational concepts described in Joint Vision 2010:[62]

* Precision weapons need accurate target coordinates.
* Mobile forces need detailed knowledge of the terrain to achieve dominant maneuvering.
* Understanding lines of communication is necessary for focused logistics.
* Attaining full-dimensional protection requires maintaining battlespace awareness on a common spatial background.

In supporting these operational concepts, the centralization of geospatial databases is a force multiplier since the commander will then be able to do more at no force size or cost increase.

The following recommendations are offered to the operational commander to meet the challenges of effectively using the geospatial information infrastructure: (1) develop a general knowledge of the kinds of geospatial information available and the means to access the databases (limitations and vulnerabilities), (2) get user training for staff who will be operating the information systems, (3) integrate supporting contractors on the information systems team (they have the knowledge and expertise to support the logistics requirements of the systems).

NOTES

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[2] "Battlespace Information, Command and Control, Operational Intelligence, and Systems Integration," Joint Military Operations Department, The U.S. Naval War College, Nov. 1996, (unpublished paper), p. 1-2.

[3] Ibid., p. 4-6.

[4] House of Representatives, National Defense Authorization Act for Fiscal Year 1997, Conference Report to Accompany H.R. 3230, 30 July 1996, Report 104-724.

[5] House of Representatives, Intelligence Authorization Act for Fiscal Year 1997, 24 September 1996, House Report 104-832.

[6] Vice President Al Gore. The Best Kept Secrets in Government. September 1996, U.S. Government Printing Office, p. 105.

[7] Chairman of the Joint Chiefs of Staff, Joint Vision 2010, Pentagon, Washington, D.C., undated, p.16.

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[10] "Preparing for the 21st Century: An Appraisal of U.S. Intelligence," 1 March 1996, Chapter 1. <http://www.access.gpo.gov/su_docs/dpos/epubs/int/report.html>

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[15] Commission on the Roles and Capabilities of the U.S. Intelligence Community <http://www.access.gpo.gov/su_docs/dpos/epubs/int/index.html>

[16] "Preparing for the 21st Century: An Appraisal of U.S. Intelligence," 1 March 1996, Chapter 1. <http://www.access.gpo.gov/su_docs/dpos/epubs/int/report.html>

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[19] C4I News, "Creation of NIMA Should Improve Intelligence Flow, Officials Say." No. 22, Vol.4, 7 November 1996.

[20] Joint Pub 2-0, Joint Doctrine for Intelligence Support to Operations, 5 May 1995, p.IV-14.

[21] House of Representatives, Intelligence Community Act, Report of the Committee on National Security on H.R. 3237, 23 July 1996, Report 104-620, Part 2, p. 20.

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[24] House of Representatives, National Defense Authorization Act for Fiscal Year 1997, Conference Report to Accompany H.R. 3230, 30 July 1996, Report 104-724, p. 803.

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